PB-247 813

IMPLEMENTATION PLAN REVIEW FOR NEBRASKA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

TRW/Environmental Services

Prepared for:

Environmental Protection Agency

December 1974

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE

364150

EPA-450/3-74-068

DECEMBER 1974

PB 247 813

IMPLEMENTATION PLAN REVIEW

FOR

NEBRASKA

AS REQUIRED

BY

THE ENERGY SUPPLY

AND

ENVIRONMENTAL COORDINATION ACT

U. S. ENVIRONMENTAL PROTECTION AGENCY

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
US Department of Commerce
Springfield, VA. 22151

EPA-450/3-74-068

IMPLEMENTATION PLAN REVIEW
FOR
NEBRASKA
REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

PREPARED BY THE FOLLOWING TASK FORCE:

U. S. Environmental Protection Agency, Region VII
1735 Baltimore Avenue
Kansas City, Missouri 64108

Environmental Services of TRW, Inc.
(Contract 68-02-1385)

U. S. Environmental Protection Agency
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

December 1974

TECHNICAL REPORT DATA (Please read Instructions on the reverse before completing)		
1. REPORT NO. EPA-450/3-74-068	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE IMPLEMENTATION PLAN REVIEW FOR NEBRASKA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT		5. REPORT DATE December 1974 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, N.C., Regional Office VII, Kansas City, Missouri, and TRW, Inc., Redondo Beach, California		10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO. 68-02-1385
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air and Waste Management Office of Air Quality Planning and Standards Research Triangle Park, North Carolina 27711		13. TYPE OF REPORT AND PERIOD COVERED Final 14. SPONSORING AGENCY CODE
15. SUPPLEMENTARY NOTES		

16. ABSTRACT

Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interferring with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised.

17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air pollution State implementation plans		
18. DISTRIBUTION STATEMENT Release unlimited	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 69
	20. SECURITY CLASS (This page) Unclassified	22. PRICE $4.50

PRICES SUBJECT TO CHANGE

EPA Form 2220-1 (9-73)

TABLE OF CONTENTS

		Page
1.0	EXECUTIVE SUMMARY	1
2.0	SIP REVIEW	6
	2.1 Summary	6
	2.2 Nebraska Air Quality Setting	7
	2.3 Current Nebraska Emissions	11
	2.4 State Implementation Plan Review	12
3.0	AQCR ASSESSMENTS FOR FUEL SWITCHING & RELGULATION RELAXATION	14
	3.1 Metro Omaha (AQCR 085)	14
	3.2 Lincoln - Beatrice - Fairbury (AQCR 145)	18
	3.3 Intrastate Nebraska (AQCR 146)	20
	3.4 Metro Sioux City (AQCR 086)	22
4.0	TECHNICAL APPENDICES	
	APPENDIX A - Background Information on SIP, Air Quality, Emissions	23
	APPENDIX B - Candidacy Assessments for Relation of Regulation/ Fuel Switch Potential	37
	APPENDIX C - Power Plant Assessments	40
	APPENDIX D - Industrial Commercial Sources Assessment	51
	APPENDIX E - Area Source Assessment	59
	APPENDIX F - Regulation Evaluation and Fuel Statistics	61
	BIBLIOGRAPHY	64

1.0 EXECUTIVE SUMMARY

The enclosed report is the U. S. Environmental Protection Agency's (EPA) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the State on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the States. The States may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however, require States to change any existing plan.

Congress has intended that this report provide the State with information on excessively restrictive control regulations. The intent of ESECA is that SIP's, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallel EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regards to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage States to either defer compliance regulations or to revise the SO_2 emission regulations. The States have also been asked to discourage large scale shifts from coal to oil in cases where such shifts are not required for the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those States with the largest clean fuels saving potential. Several of these States have or are currently in the process of revising SO_2 regulations. These States are generally in the Eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 States and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, three predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are 1) The use of the example region approach in developing State-wide air quality control strategies; 2) the existence of State Air Quality Standards which are more stringent than NAAQS; and 3) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations affect many State plans and in some instances conflict with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIP's conducted in 1972. At that time SIP's were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a State to identify the most polluted air quality control region (AQCR) and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCR's of the State if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in excessive controls, especially in the utilization of clean fuels, for areas of the State where sources would not otherwise contribute to NAAQS violations. For instance, a control strategy based on a particular region or source can result in a regulation requiring 1 percent sulfur oil to be burned state-wide where the use of 3 percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of States will use the review findings to assist them in making the decision whether or not to revise portions of their State Implementation Plans. However, it is most important for those States which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there has been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the reports' findings are based is the most currently available to the Federal Government.* However, EPA believes that the States possess the best information for developing revised plans. The States have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of air quality standards. Therefore, those States desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that States select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increased TSP, NO_x, and HC emissions which occur in fuel switching, and other potential air pollution problems such as sulfates .

Although the enclosed analysis has attempted to address the attainment of all the NAAQS, most of the review has focused on total suspended particulate matter (TSP) and sulfur dioxide (SO_2) emissions. This is because stationary fuel combustion sources constitute the greatest source of SO_2 emissions and are a major source of TSP emissions.

* Other than data currently being processed by EPA.

Part of each State's review was organized to provide an analysis of the SO_2 and TSP emission tolerances within each of the various AQCR's. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendix C, D, and E.

FINDINGS

- The Nebraska State Implementation Plan has been reviewed for the most frequent causes of overly restrictive emission regulations. Nebraska used the example region approach in developing control strategies for both TSP and SO_2 and there are indications that the existing SO_2 regulation may be more restrictive than required to meet NAAQS. There are no indications that current particulate emission regulations are overly restrictive in the context of Section IV of ESECA. In any case, current Nebraska regulations are not apparently the roadblock to the use of fuels which will cause higher levels of particulates and SO_2 to be emitted. Substantial fuel switching could occur without violating either particulate or SO_2 emission regulations. The acheivement of NAAQS may be the limiting factor.

- Total suspended particulate concentraions exceed the NAAQS at many monitoring stations in Nebraska. Particulate emission regulations which were in effect only in the Omaha and Lincoln regions are now applied statewide. Although much of the TSP problem may be attributable to wind blown fugitive dust, any increase in man made emissions will generally aggravate the situation. Since many sources in Nebraska are currently emitting below what regulations would allow, no relaxation of the particulate emission regulations is recommended if NAAQS is to be attained.

- Data available for this report show SO_2 levels to be below the NAAQS in Nebraska. Furthermore, Nebraska has no proposed Air Quality Maintenance Areas for SO_2. Although Nebraska has recently adopted a statewide SO_2 emission regulation, only a few sources are affected because of current fuel combustion practices. At present, the SO_2 emission regulations may be more restrictive than air quality would dictate in many parts of the state. However, considerable SO_2 emission increases could occur via fuel switching within the limits of the present regulations. In this context, the present regulation does not appear overly-restrictive.

2.0 STATE IMPLEMENTATION PLAN REVIEW

2.1 SUMMARY

A revision of fuel combustion source emissions regulations will depend on many factors. For example:

- Does the State have air quality standards which are more stringent than NAAQS?
- Does the State have emission limitation regulations for control of (1) power plants, (2) industrial sources, (3) area sources?
- Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?
- Has the State initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?
- Are there proposed Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment date for NAAQS?
- Based on (1973) air quality data, are there no reported violations of NAAQS?
- Based on (1973) air quality data, are there indications of a tolerance for increasing emissions?
- Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources?
- Must emission regulations be revised to accomplish significant fuel switching?
- Is there a significant clean fuels savings potential in the region?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?

The following portion of this report is directed at answering these questions. An AQCR's potential for revising regulations is then determined by a consideration of the answers to the above questions.

The initial part of the SIP review report, Section 2 and Appendix A, was organized to provide the background and current situation information for the State Implementation Plan. Section 3 and the remaining Appendices provide an AQCR analysis which helps establish the overall potential for revising regulations. Emission tolerance estimates have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for revising emission limiting regulations. In conjunction with the regional analysis, a characterization of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendix C, D, E. Finally, candidates from Appendix B are examined in Appendix F for adequacy or overrestrictiveness of emission regulations.

Based on an overall evaluation of EPA's current information, AQCR's have been classified as good, marginal, or poor candidates for regulation revisions. The following table summarizes the State Implementation Plan Review. The remaining portion of the report support this summary with explanations.

2.2 Nebraska Air Quality Setting

The state of Nebraska is divided into four Air Quality Control Regions:

1. AQCR 085 - Metro Omaha-Council Bluffs Interstate
2. AQCR 086 - Metro Siou City Interstate
3. AQCR 145 - Lincoln-Beatrice-Fairbury
4. AQCR 146 - Intrastate Nebraska

The boundaries of Nebraska's AQCR's are shown in Figure A-1. Ambient Air Quality Standards for SO_2 and TSP in Nebraska are identical to federal standards and are shown in Table A-3.

NEBRASKA STATE IMPLEMENTATION PLAN REVIEW
(SUMMARY)

"INDICATORS"	STATE		(Matro Omaha) AQCR 085		(Sioux City) AQCR 086		(Lincoln) AQCR 145		(Outstate) AQCR 146	
	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2
• Does the State have air quality standards which are more stringent than NAAQS?	No	No								
• Does the State have emission limiting regulations for control of:										
1. Power plants	Yes	Yes								
2. Industrial sources	Yes	Yes								
3. Area sources	No	No								
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?	Yes	Yes								
• Has the State initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?	No	No								
• Are there proposed Air Quality Maintenance Areas?	No	No	No	No	No	No	No	No	No	No
• Are there indications of a sufficient number of monitoring sites within a region? (1)			Yes	No	No	No	Yes	No	Yes	No
• Is there an expected 1975 attainment date for NAAQS?	Yes	Yes								
• Based on reported (1973) Air Quality Data, does air quality meet NAAQS?	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
• Based on reported (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?			No	Yes	No	Yes	No	Yes	No	Yes
• Are the total emissions from stationary fuel combustion sources lower than those of other sources?			No	No	Yes	No	Yes	No	Yes	Yes
• Do modeling results for specific fuel combustion sources show a potential for a regulation revision?	none	No modeling results available for sources in Nebraska								
• Must emission regulations be revised to accomplish significant fuel switching?	No	No	No	No	No	No	No	No	No	No
• Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?			Poor	Marginal	Poor	Marginal	Poor	Marginal	Poor	Marginal
• Is there a significant Clean Fuels Saving potential in the region?		Yes (2)		Yes		No		Yes		Yes

(1) Only an analysis tool is not indicative of SIP requirements.

(2) Many Nebraska SO_2 sources could, in principle, increase emissions without violation of either NAAQS or existing SO_2 regulations. Thus some dirtier fuels might be used, resulting in clean fuel savings.

Figure A-1. Nebraska AQCRs

Reproduced from best available copy.

2.2.1 Air Quality Monitoring in Nebraska

Suspended particulates are monitored at several stations in each AQCR. Of the four AQCR's, only AQCR 086 (Sious City Interstate) appears to have limited TSP data (see Table A-4). SO_2 on the other hand is monitored only by SO_2 24-hour bubbler samplers (operated about once every 2 weeks) in Nebraska AQCR's (see Table A-5). AQCR 085 (Omaha-Council Bluffs) has 3 such SO_3 monitors, while AQCR 145 (Lincoln-Beatrice-Fiarbury) and AQCR 146 (Intra-state Nebraska) have 2 monitors each. AQCR 086 (Sioux City) has only one SO_2 monitor, and this is located in Iowa.

2.2.2 Suspended Particulates

Table A-4 indicates TSP to be a widespread problem in Nebraska. AQCR 085 (Metro Omaha) shows several violations of both the annual and 24-hour TSP standards, both in Nebraska and in Iowa. AQCR 145 (Lincoln-Beatrice-Fairbury) shows several violations of the short term TSP standard, especially in Lancaster County. Annual geometric means in Lincoln city are currently just slightly above or below the secondary standard. AQCR 086 (Metro Sioux City) shows the Nebraska portion to have a problem with the short term standard. The outstate Nebraska AQCR (146) has problems with both annual and short term standards at several monitoring stations. All stations but one (in Cass County) however, show an annual geometric mean less than the primary standard. Widespread short term violations may reflect fugitive dust contributions in AQCR 146.

Table A-4 is intended to show both the intensity and breadth of the TSP problem in Nebraska. Included are calculations of the percent reduction required to meet both the annual and short term standard at the worst station in each AQCR.

2.2.3 Sulfur Dioxide

Table A-5 is a sketch of the SO_2 data for Nebraska. The small number of samplers and measurements makes spacial distribution of SO_2 difficult to assess. It appears that, at least in the vicinity of the SO_2 monitors, SO_2 levels are only 10 to 30% of the ambient air quality standards. This may m merely reflect, however, that monitors are not source-oriented. The scanty SO_2 data does suggest that SO_2 emissions can probably be increased and still not show violation of ambient air quality standards.

2.3 Current Nebraska Emissions

2.3.1 Nebraska Emissions Summary - SO_2

Tables A-6, A-7, and A-10 summarize SO_2 emissions in Nebraska's four AQCR's. Except in outstate Nebraska (#146), the majority of SO_2 results from fuel combustion, as might be expected, and the major contributors to fuel combustion are power plants. Industrial sources are minor SO_2 contributors throughout Nebraska. The exact emissions breakdown is tabulated in A-7. Note that in outstate AQCR (#146) area sources predominate. Table A-10 shows the estimated total SO_2 emissions in the original SIP for Metro Omaha (#085) to be 61,000 tons per year, a higher figure than the 1972 NEDS estimate (45,000 tons/year). The NEDS figure may simply be less complete than the SIP figure, since no SO_2 emission controls were in effect in either inventory. AQCR 086, the Sioux City Interstate, has few SO_2 emissions originating in Nebraska, and no power plants exist in the Nebraska side of AQCR 086.

2.3.2 Nebraska Emissions Summary - Particulates

Tables A-6, A-8, and A-10 summarize particulate emissions in Nebreska's four AQCRs. Only in the Metro Omaha area (#085) does a large fraction of total particulate emissions result from fuel combustion. In both Omaha (#085)

and Lincoln (#145), however, power plants are the largest particulate sources within the fuel combustion category. As was mentioned in connection with SO_2 emissions, there are no Nebraska power plants in AQCR 086 (Sioux City) and few other particulate emissions from the Nebraska side. Outstate Nebraska (#146) has a large particulate emission inventory, but sources are generally widely dispersed. Only about 10% of emissions are fuel related in AQCR 146, and a very small portion of this can be attributed to electric power production. Table A-9 allows a comparison of particulate emissions inventories based on original SIP and NEDS data, at least for the Omaha and Lincoln AQCR's.

2.4 Review of Nebraska State Implementation Plan

2.4.1 Background on SIP - Particulates

The SIP control strategies and regulations used for AQCR 085 (Metro Omaha) as the example region for the state. The original priority classifications for TSP (and SO_2) are shown in Table A-1. Particulate emission regulations were applied to the AQCR 085 (Metro Omaha) and Lancaster County of AQCR 145 (Lincoln). The proposed (and existing) fuel burning emission regulations are shown in Table A-11. Although the plan contained no emission limitations applicable in the two regions classified priority III for particulates (Metro Sioux City-086 and Intrastate-146). Nebraska has since adopted particulate regulations statewide.

EPA disapproved the portion of the SIP pertaining to AQCR 145 (Lincoln) and required regulations in Jefferson, Gage, and Thayer Counties in addition to Lancaster County of AQCR 145. The emissions inventory (by EPA) for AQCR 145 is shown in Table A-9 along with that by the state for AQCR 085 (Metro Omaha). EPA also prepared regulations covering review of sources in AQCR's 086 (Metro Sioux City) and 146 (Intrastate) which the state exempted (this includes sources subject to federal new source performance standards ((40 CFR

Part 60))). Federal indirect source review regulations will be rescinded when the state approves its own regulations.

2.4.2 Background on SIP - SO_2

Original SO_2 priority classification for Nebraska AQCR's were III for AQCR's 086 (Metro Sioux City), 145 (Lincoln), and 146 (Intrastate) and II for AQCR 085 (Metro Omaha) (see TAble A-1). The latter priority was based on expected SO_2 concentration resulting from modeling rather than actual measured air quality data. Consequently, no SO_2 emission limitations were applied in the original Nebraska SIP. The federal New Source Performance Standards and review procedures were assumed to be adequate to prevent source growth which might interfere with maintenance of the secondary standards in all regions of the state. The SIP emission inventory and 1975 projections for AQCR 085 (Metro Omaha) are shown in Figure A-10.

2.4.3 Background on SIP - NO_2

Since AQCR 085 (Metro Omaha) was priority I for NO_2 in the original SIP, NO_2 regulations were proposed (in addition to the Federal Motor Vehicle Control Program) for oil and gas fired boilers, and for nitric acid and fertilizer manufacturing. Reclassification of 085 to priority III in 1973 allowed Nebraska to withdraw the NO_2 regulations on fuel burning sources. No regulations currently exist for NO_x emissions from fuel burning sources and no further discussion of NO_x emissions is pursued in this report.

2.4.4 Background on SIP - Oxidant

Nebraska had maximum oxidant concentrations just below the standard (160 ug/m^3) in 1970. The original SIP assumed that motor vehicle hydrocarbon emissions would provide sufficient controls to meet the standard.

2.4.5 Current Regulations

Regulations adopted by the state as part of the Nebraska Environmental Protection Act (effective February 26, 1974) are essentially those of the original SIP, with the addition of an SO_2 limit of 2.5 lbs/10^6Btu heat input on fuel burning equipment. Particulate regulations apply statewide. Table A-12 summarizes the regulations as of February 26, 1974.

2.4.6 Special Considerations

Table F-3 shows approximate state totals for fossil fuel production and consumption in Nebraska for 1972. Nebraska produces only a small fraction of itsenergy. No coal was produced within the state in 1972 and Nebraska has essentially no coal reserves. Thus, almost any type of fuel switch contemplated for Nebraska will involve fuels from other states.

3.0 AQCR ASSESSMENTSFOR FUEL SWITCHING AND REGULATION RELAXATION

Each AQCR in Nebraska is evaluated separately in this section for its tolerance for increased emissions of SO_2 and particulates. Power plants, industrial/commercial sources, and area sources are then considered for their impact of fuel switching on emissions and air quality. Finally, an evaluation of existing regulations is made.

3.1 Metro Omaha (AQCR 085)

3.1.1 Particulates

Tables A-4 and A-9 indicate that particulates are a widespread problem relative to both short term and annual standards in AQCR 085 (Metro Omaha), requiring around 50% reduction of emissions based on current air quality. The "allowable" emissions based on the original SIP are similar to the "allowable" particulate emissions from rollback of NEDS emissions proportional to air quality (Table A-9). The NEDS data bank indicates about 18,000 tons of particulates currently emitted annually compared to about 25,000 tons estimated in the original SIP, suggesting perhaps some progress in control. Based on

these numbers, Omaha is assigned zero tolerance for increased particulate emissions, since there is no indication from data here that emissions will be reduced to levels below that required to attain air quality.

Table B-1 shows that no AQMA designation has been made for AQCR 086. Also indicated in Table B-1 is a high percentage of particulate emissions resulting from fuel combustion. Metro Omaha is therefore classified as a poor candidate for increased particulate emissions and particulate regulation relaxation.

3.1.2 Sulfur Dioxide

As Table A-10 shows, Omaha (AQCR 085) can tolerate increased emissions of SO_2. Insufficient data is available to determine the regionwide "allowable" for SO_2 regulation relaxation and fuel switch potential.

3.1.3 Power Plants

Table C-1 lists the four Nebraska power plants in the Metro Omaha AQCR 085, along with current fuel usage and emissions. Notice that all plants but the small South Omaha plant are currently using some coal and that all plants are currently emitting below SO_2 regulations. The middle column in Table C-2 for AQCR 085 shows the emissions which would result if the Kramer, Jones St., and N. Omaha plants were converted entirely to coal (having the percent sulfur listed in Table C-1) and also if the South Omaha plant converted entirely to 2% sulfur oil. No additional emissions controls were assumed. SO_2 emissions are seen to increase fourfold while particulate emissions would double over current emissions following the fuel switch. It might be commented that the Kramer plant dominates the particulate total both before and after the fuel switch, due to the lack of emission controls (at the time of the NEDS emission estimate). An additional calculation was made in Table C-2, showing the emissions resulting from conversion of all natural gas use to 2.0% sulfur oil in the Nebraska power plants of AQCR 085.

From the tabulation in C-2, conversion of all power plants to coal would result in almost five times more particulate emissions than allowable (Table A-9). Of course, some additional controls on particulates would probably occur along with any fuel conversion. The intent here is to show the degree of control that would be necessary to reach air quality standards if the assumed fuel schedule became reality. Allowable SO_2 emissions are not known with any certainty, so that only the magnitude of emissions increase with fuel switching in power plants can be demonstrated by the calculations in Table C-2.

3.1.4 Industrial Sources

Some Nebraska industrial sources which might be fuel siwtch candidates are listed in Table D-1 for the Omaha AQCR. Notice that no coal was used by industry at the time the NEDS inventory was assembled. The only calculation for industrial sources in AQCR 085 was a fuel switch from natural gas to 2.0% sulfur oil. Table D-2 summarizes AQCR total SO_2 and particulate emissions accompanying this fuel switch.

3.1.5 Area Sources

Area sources account for about 2/3 of the fuel used in Nebraska (Table E-1). Although individual AQCR breakdowns were not available, a few generalizations can be made: (1) most sources are small and hence not subject to emission controls in Nebraska, (2) a large amount of natural gas is currently used, (3) most of the sources could not easily change to coal, (4) because of clean fuel use by area sources in Nebraska, only a small percentage of the total emissions results from these sources (except in AQCR 146-Intrastate). Area sources are not examined further in this report since regulation changes would generally not be needed to accomplish fuel switching, even if such switching were deemed feasible or desirable.

3.1.6 Regulation Evaluations - Particulates

Since the fuel switch calculation in Table C-1 for AQCR 085 does not relate directly to regulation relaxation, Table F-1 was included. Here, all fuel users are emitting exactly at SO_2 and particulate regulations. The uncontrolled non-fuel sources are also included and the total resulting emissions may be compared to the "allowable" emissions for the AQCR. It can be seen that, on an AQCR basis, considerable control of non-fuel sources in Metro Omaha would be necessary to reduce the 9438 tons in this scenario to the 8500 "allowed" tons (see Table F-1 for AQCR 085). Thus existing fuel source particulate regulations show no room for relaxation in AQCR 085.

3.1.7 Regulation Evaluations - SO_2

The judgement about regulations for SO_2 in Metro Omaha is more subjective than for particulates. Tables C-2 and D-2 for Metro Omaha (085) indicate a fourfold emissions increase from power plants and more than tenfold increase from industrial sources under the assumed fuel conversions. Power plants are a more important consideration since they represent the larger fuel and SO_2 emissions potential. Table F-2 illustrates that SO_2 emissions would almost double over those at present in Metro Omaha when existing regulations are exactly met. Despite the low SO_2 concentrations reported in the Omaha AQCR, it seems reasonable that a doubling of the regionwide SO_2 emissions will more than double ambient air concentrations in local spots. The SO_2 regulations can likely, however, be relaxed without exceeding ambient standards. The amount of relaxation would have to rely on source-specific information (i.e., modeling) and the extent of total fuel conversions expected in the entire region.

3.1.8 Special Considerations - Oxidant

Recent violations (1972) of the 160 $\mu g/m^3$ federal oxidant standard in Omaha suggested that a sheck of the possible hydrocarbon increases which might occur in AQCR 085 if gas use were replaced by coal in power plants. Applying the emissions factors in Table C-3 for hydrocarbons from power plants to the fuel use scenarios in Table C-2 indicates that about 100 tons of additional hydrocarbons would result from the coal switch. The original SIP hydrocarbon inventory for 1970 showed some 66,000 tons, and this was projected to decrease to about 45,000 tons by 1975. The magnitude of these numbers dwarfs any increase in hydrocarbon emissions resulting from power plant fuel switching. It appears that coal use in power plants would not significantly affect oxidant levels in Omaha, via hydrocarbon emissions.

3.1.9 Special Consideration - Iowa Emissions Regulations

About 20% of SO_2 emissions and 10% of particulate emissions in AQCR 085 originate in Iowa. Ambient air levels for SO_2 and TSP are slightly lower in Iowa than in Nebreska. This report considers only Nebraska sources and regulations, and the rought regulation examinations in Appendix F ignores Iowa sources. "Allowable" emissions in Appendix F are proportioned according to existing emissions in Nebraska and Iowa.

The dominance of Nebraska emissions to the AQCR 085 totals for SO_2 and TSP results in essentially the same conclusions about Nebraska regulations whether Iowa aggregated emissions are considered or not. The effect of Nebraska emissions on Iowa regulations in AQCR 085 is addressed in the Iowa SIP review.

3.2 AQCR 145 (Lincoln-Beatrice-Fairbury)

3.2.1 Particulates

Table A-9 summarizes SIP and NEDS emissions data for AQCR 145. Since the two emissions data sources do not appear comparable, the emissions

tolerance in AQCR 145 was based solely upon current air quality. Particulate air quality violations occur mainly in Lancaster County and are relative to the short term standards. Other counties in AQCR 145 might be better candidates than Lancaster County for additional emissions. On an AQCR basis, however, no additional particulate emissions can be allowed.

In contrast to the Omaha AQCR (085), only a small percent (17%) of the total particulate emissions result from fuel combustion in AQCR 145. Based on the short term and local nature of particulate air quality violations, and the small percentage of emissions resulting from fuel combustion, AQCR 145 is rated as a marginal candidate for fuel switch potential and regulation relaxation in Table B-1.

3.2.2 Sulfur Dioxide

The low SO_2 levels (Table A-5) in AQCR 145 make the region a good candidate for increased SO_2 emissions and possible fuel switching in Table B-2. As with other regions in Nebraska, it is not possible to quantify allowable SO_2 emissions.

3.2.3 Power Plants

Of the five power plants listed in Table C-1 for AQCR 145, two currently use coal for part of their heat input. Note that all plants are currently emitting below the 2.5 $lbs/10^6$ Btu SO_2 regulation. Conversion of all plants in AQCR 145 to coal and 2.0% sulfur oil (where a coal switch is not possible) results in about 3½ times more SO_2 emission than at present (Table C-2), while uncontrolled particulate emissions would more than double.

3.2.4 Industrial Sources

Table D-1 for the Lincoln region (AQCR 145) shows that major fuel burning emission sources use no coal at present. The emissions resulting from a switch of these sources to 2.0% sulfur fuel oil are shown in Table D-2. Particulate emissions are seen to almost double while SO_2 emissions would nearly triple.

These increases are not as significant as those from power plants upon fuel switching.

3.2.5 Regulation Evaluation - Particulates

Tables F-1 and F-2 calculate emissions resulting when all sources in AQCR 145 emit according to state regulations. For particulates, the adequacy of existing fuel burning regulations is seen to be less important than non-fuel regulations as far as achieving "allowable" emissions. Fuel emission regulations could be modified in AQCR 145 if due consideration were given to controls of non-fuel sources.

3.2.6 Regulation Evaluation - SO_2

SO_2 regulations applied to all sources in AQCR 145 show an increase of approximately 40% over existing emissions. AQCR 145 could likely tolerate this increase without violating the ambient SO_2 standards.

3.3 AQCR 146 (Intrastate)

3.3.1 Particulates

Table A-4 indicates widespread violations of both short term and annual particulate standards in Intrastate Nebraska. Of course, emissions listed in Tables A-6 and A-8 for particulates are also dispersed over a large area. No SIP emissions data was available for 146 in Table A-10, so that a zero particulate emission tolerance is assigned to the region as a whole based solely upon current air quality. Despite the low percentage of emissions resulting from fuel combustion (Table B-1) in AQCR 146, this AQCR must be called a poor candidate for fuel switch potential and relaxation of regulations from a particulates standpoint.

3.3.2 Sulfur Dioxide

As elsewhere in Nebraska, SO_2 levels in AQCR 146 are very low, although monitoring is scanty. Like particulate emissions, SO_2 emissions are widely separated in AQCR 146, although a larger fraction of the total emissions of

SO_2 result from fuel combustion than is the case with particulates. "Allowable" emissions are not quantifiable from current air quality data (Table A-10), and would probably have little meaning in any case for such a large region with dispersed sources. AQCR 146 is rated as a good candidate for fuel switching and regulation relaxation relative to sulfur dioxide.

3.3.3 Power Plants

Most of the power plants shown in Table C-3 for AQCR 146 are small and are not currently using coal. Only the two plants in Freemont use coal for part of their fuel. Since power plants in AQCR 146 are widely spaced, it has little meaning to sum up emissions for the entire region, either for the current fuel schedule, or an assumed switch. For consistency, however, the AQCR totals are shown in TAble C-2. Either coal or oil switching from natural gas would drastically increase local SO_2 emissions over those at present. Controls for particulates would need to accompany the coal switch in Freemont if air quality is not to be violated.

3.3.4 Industrial Sources

As with power plants, industrial sources are widely spaced in AQCR 146. Only tow industrial sources currently use coal so that the fuel switch calculation in Table D-1 is based upon replacing gas with 2.0% sulfur oil. The regional totals are shown in Table D-2, although this probably has little meaning. Local emissions will increase if fuel switching occurs.

3.3.5 Regulation Evaluation - Particulates

The calculations in Table F-1 reinforce the conclusion that area sources dominate the particulate emission inventory in AQCR 146. Aggregated emissions indicate power plants are emitting below "average" regulations at present for particulates while industrial sources are above "average" regulations. The major conclusion to be drawn from Table F-1 regarding particulates

is that all fuel burning sources would not dramatically affect the inventory, even when emitting up to regulations. This does not, however, suggest that any relaxation should occur in current particulate fuel burning regulations. Unless specific local information exists to the contrary, AQCR 146 should not relax particulate regulations if air quality is to be attained.

3.3.6 Regulation Evaluation - SO_2

Table F-2 shows SO_2 emissions to be well below "average" regulations currently. Much more high sulfur fuels could be used in the region as a whole without disobeying existing regulations. The widely spaced nature of SO_2 sources in AQCR 146 may also mean that existing regulations could be relaxed and still maintain air quality below standards.

3.3.7 Special Considerations - Proposed Power Plants (AQCR 146)

Table C-4 shows the information available at this time about emissions projected from the proposed Gentleman Power Plant at Sutherland, Nebraska (scheduled for operation in 1977). Federal New Source Performance Standards prevail for such a plant, requiring about 75% control of SO_2 for the coal expected to be burned. Particulates will apparently be well controlled. No monitoring information or air quality modeling is available for the proposed site. The data in C-4 is provided for background purposes only.

3.4 AQCR 086 (Metro Sioux City)

Tables A-7 and A-8 show few emissions of either particulates or SO_2 in this AQCR originating in Nebraska. Further, little fuel is used in the Nebraska portion of 086, and no power plants are located there. The marginal air quality relative to particulate standards makes the Nebraska portion of 086 a poor candidate for fuel switching or clean fuel savings. Detailed analysis of the Iowa portion of AQCR 086 will appear in the Iowa state report.

APPENDIX A

- State implementation plan information
- Current air quality information
- Current emissions information

Tables in this appendix summarize original and modified state implementation plan information, including original priority classifications, attainment dates, ambient air quality standards, and fuel combustion emission regulations. SAROAD data for SO_2 and TSP monitoring stations are shown for AQCRs in the state. NEDS emissions data by AQCR[1] are tabulated and broken down into fuel burning categories.

Tables A-9 and A-10 show a comparison of emission inventories in the original SIP and those from the NEDS. An emission tolerance, or emission tonnage which might be allowed in the AQCR and still not violate national secondary ambient air quality standards, is shown for SO_2 and particulates. The intent of this calculation is to indicate possible candidate regions for fuel switching. Tolerance was based on either the degree of control expected by the SIP or upon air quality/emission relationships which are calculated from more recent data. The value of the emission tolerance provides an indication of the potential an AQCR possesses for fuel revisions and regulation relaxation.

Methodology for Increased Emissions Tolerance

A tolerance for increased emissions was determined as follows. First, an "allowable emissions" was calculated for each AQCR based on the current NEDS data and the percent reduction (or increase) required to meet the national secondary ambient air quality standards in that AQCR (worst case from Tables A-4 and A-5). This "allowable" was then compared to that from the SIP. If reasonable agreement occurred, then the "estimated emissions" which would result after implementation of the SIP in that AQCR was used to calculate an emissions tolerance. Thus, some credit could be given to an AQCR which might be restricting emissions more than required by ambient air quality standards. For instance, emission controls applied to AQCRs

---

[1] "1972 National Emissions Report," EPA - 450/2-74-012, June 1974.

other than the example region for the state may reduce emissions well below "allowables." In the event that no data existed or was available from the SIP for an AQCR, the current air quality was used to assign emissions tolerance based on proportional rollback or rollup. Current air quality was also the criteria, if emissions data from SIP and NEDS did not appear to be comparable (this is often the case).

When no SIP emissions data was available, and current air quality levels were less than one half of the level represented by an ambient air quality standard, no "rollup" emissions tolerance was calculated in Tables A-10 and A-10. This arbitrary cutoff point was chosen so as not to distort the emissions tolerance for an area. At low levels of a pollutant, the relationship between emissions and air quality is probably not linear. Although this cutoff may leave some AQCRs with no quantifiable emissions tolerance, it was felt that no number at all would be preferable to a bad or misleading number.

It is emphasized that emissions tolerance is a region-wide calculation. This tolerance obviously makes more sense in, say, an urban AQCR with many closely spaced emissions sources than in a largely rural AQCR with geographically dispursed emissions.

A word of caution regarding particulates needs mentioning. Emission source estimates in the NEDS data bank and most state SIP's are for total particulates. Generally, the control strategies for particulates are aimed at total particulates, while the high-volume particulate sampling (SAROAD data) measures only the finer, suspended fraction. A given level of total particulate emissions control will therefore not translate into the same level of measured ambient air quality. Some of the larger particulates being controlled will not remain suspended, and therefore would not be measured by the High-volume technique. Hence, particulate control plans may have underestimated the amount of control necessary to achieve ambient air quality standards.

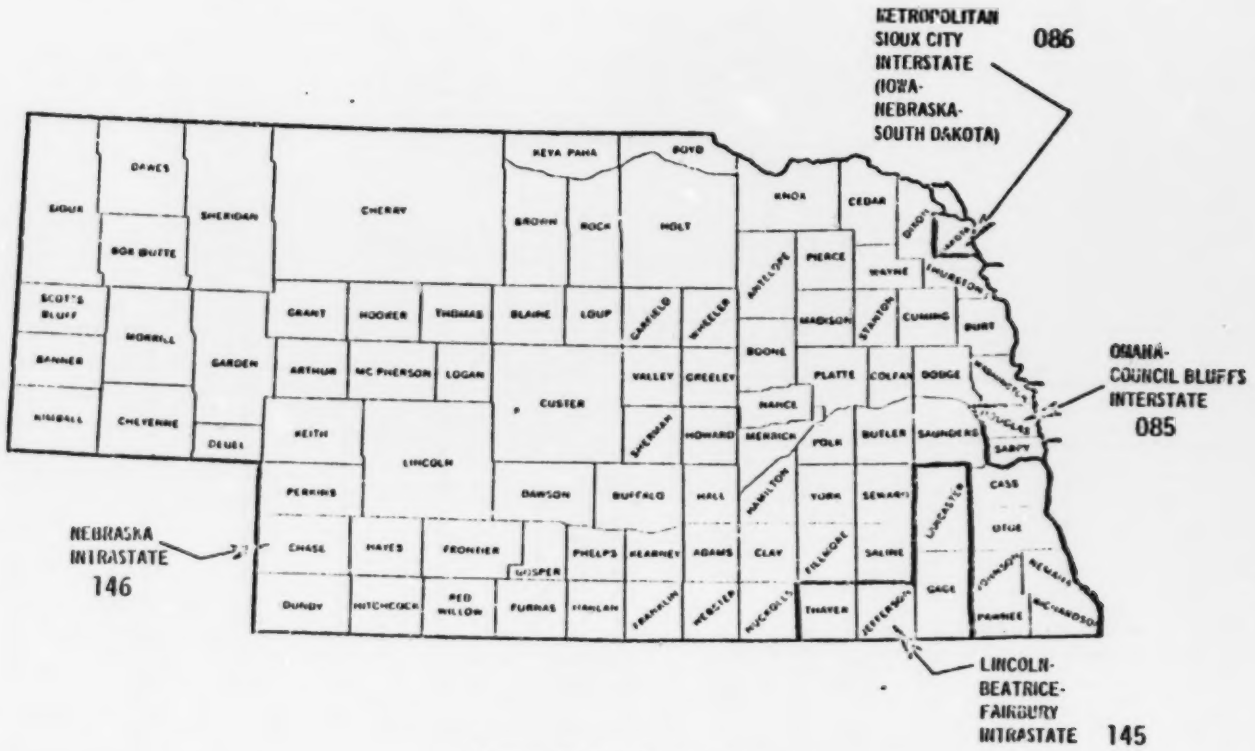

Figure A-1. Nebraska AQCRs

Reproduced from best available copy.

Table A-1. AQCR Priority Classification and AQMAs

AQCR	Fed. #	Part.	SO_x	NO_x	Demographic Information			AQMA Designations		
					Population 1970	Square Miles	Population Density	TSP Counties	SO_x Counties	NO_x Counties
Metro Omaha	085	I	II	III					None	
Neb					456,000	574	800	none		
Iowa					87,000	963	90	One		
					543,000	1540	352			
Metro Souix City	086	III	III	III				None	None	
Neb					13,000	255	51			
Iowa					155,000	2500	62			
S. Dakota					9,600	452	21			
					178,000	3200	56			
Lincoln	145	III	III	III	212,000	2860	74	None	None	
Intrastate	146	III	III	III	285,000	30,600	9	None	None	

Criteria Based on Maximum Measured (or Estimated) Pollution Concentration in Area

Priority	I	II	III
	Greater than	From - To	Less than
[d]Sulfur oxide:			
Annual arithmetic mean . .	100	60-100	60
24-hour maximum.	455	260-455	260
[b]Particulate matter:			
Annual geometric mean . . .	95	60-95	60
24-hour maximum	325	150-325	150
[c]Nitrogen dioxide	110		110

[d]Federal Register, August, 1974 SMSA's showing potential for NAAWS violations due to growth

Table A-2. Nebraska Attainment Dates

AQCR #	Name	Particulates Attainment Dates		Sulfur Dioxide Attainment Dates		Nitrogen Oxides Attainment Dates
		Primary	Secondary	Primary	Secondary	
085	Metro Omaha - Council Bluffs Interstate	7/75	7/75	a	a	a
086	Metro Sioux City Interstate	a	7/75	a	a	a
145	Lincoln-Beatrice-Fairbury	a	7/75	a	a	a
146	Outstate Nebraska	a	7/75	a	a	a

(a) Already below Federal standards.

Table A-3. Ambient Air Quality Standards - Nebraska (Expressed as $\mu g/m^3$)

		Total Suspended Particulate		Sulfur Oxides				Nitrogen Dioxide
		Annual	24 hr.	Annual	24 hr.	3 hr.	1 hr.	
Federal	Primary	75(G)	260 [a]	60(A)	365 [a]	-		100(A)
	Secondary	60(G)	150 [a]	-	-	1300 [a]		100(A)
State	All Stds. are same as federal							

(A) Arithmetic mean

(G) Geometric mean

a Not to be exceeded more than once per year

Table A-4. NEBRASKA AQCR Air Quality Status (1973), TSP

AQCR Name	AQCR #	# Stations Reporting	TSP Concentration ($\mu g/m^3$) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	# Stations Exceeding Ambient Air Quality Standards Primary Annual	Primary 24-Hr[c]	Secondary Annual	Secondary Annual %	Secondary 24-Hr[c]	Secondary 24-Hr %	% Reduction Required to Meet Annual Secondary Standard [a]	% Reduction Required to Meet 2nd 24 hr Standard [b]
Metro Omaha Council Bluffs Interstate	085												
Nebraska		12	127	432	316	2	1	4	33	6	50	53[d]	53[e]
Iowa		3	-	243	205	-	0	-	-	3	100	-	26
Metro Sioux City Interstate	086												
Nebraska		1	50	496	219	1	0	1	100	1	100	33	32
Iowa		1	90	218	189	0	0	0	0	1	100	0	21
Lincoln-Beatrice Fairbury	145	13	61	495	432	0	2	2	15	3	23	2	65
Outstate Neb	146	18	102	411	356	1	2	5	28	7	39	41	58

a) assumes background of 22 mg/m^3

b) no background assumed

c) violations of the 2nd highest reading at any station

d) $\left(\frac{\text{Annual - Annual Secondary Standard}}{\text{Annual - Background}}\right) \times 100$

e) $\left[\left(\frac{\text{2nd Highest 24 Hr - 24-Hr Secondary Standard}}{\text{2nd Highest 24-Hr - Background}}\right) \times 100\right.$

Table A-6. Nebraska Fuel Combustion Source Summary[a]

AQCR	AQCR #	Nebraska Power Plants NEDS[b]	Nebraska Power Plants FPC[c]	Other Fuel Combustion Point Sources[b] Particulate	Other Fuel Combustion Point Sources[b] SO_2
Metro Omaha Council Bluffs	085	4	3	12	22
Metro Sioux City	086	0	0	3	1
Lincoln - Beatrics Fairbury	145	5	3	5	10
Outstate	146	6	7	16	11

a Nebraska only

b NEDS July 1974

c Existing or projected plants existing in data bank (EPA)

Table A-5. Nebraska AQCR Air Quality Status (1973), SO_2 [a]

AQCR Name	AQCR #	# Stations Reporting 24-Hr (Bubbler)	# Stations Reporting (Contin.)	SO_2 Concentration ($\mu g/m^3$) Highest Reading Annual	1st 24-Hr	2nd 24-Hr	# Stations Exceeding Ambient Air Quality Stds. Primary Annual	Primary 24-Hr[b]	Secondary 3-Hr	% Reduction Required To Meet Primary 24 hr Standard
Metro Omaha-Council Bluffs Interstate	085		0							
Nebraska		2		-	31	27	-	0	-	0
Iowa		1		-	29	2		0		0
Metro Sioux City Interstate	086		0							
Nebraska		0		-			-	0	-	0
Iowa		1		-	2	2		0		0
Lincoln-Beatrice Fairbury	145	2	0	-	111	16	-	0	-	0
Outstate	145	2	0	-	10	10	-	0	-	0

a) 1973 Air Quality Data (SAROAD) as of June 7, 1974

b) Highest reading used when second high was unavailable

Table A-7. Nebraska Emissions Summary, SO_2

AQCR	Total[a] (10^3 Tons/Year)	Percent Fuel Combustion	Electricity Generation (10^3 Tons/Year)	%	Point Source Fuel Combstion (10^3 Tons/Year)	%	Area Source Fuel Combustion (10^3 Tons/Year)	%
085								
Nebraska	37.3	77	26.2	-	0.66	-	1.93	-
Iowa	8.0	92	7.13	-	.001	-	0.30	-
Total	45.3	80	33.3	73.5	0.66	1.5	2.2	4.9
086								
Nebraska	0.09	50	0	-	0	-	.045	-
Iowa	14.64	95	13.2	-	.08	-	.065	-
	14.7	95	13.2	89	.08	0.5	0.70	4.8
145	16.0	96	13.7	86	0.79	4.9	0.81	5.1
146	10.5	58	0.19	1.8	1.5	14	4.4	42

(a) 1972 National Emissions Report, EPA - 450/2-74-012, June 1974

Table A-8. Nebraska Emissions Summary, Particulates

AQCR	Total[a] (10^3 Tons/Year)	Percent Fuel Combustion	Electricity Generation (10^3 Tons/Year)	Electricity Generation %	Point Source Fuel Combstion (10^3 Tons/Year)	Point Source Fuel Combstion %	Area Source Fuel Combustion Tons/Year	Area Source Fuel Combustion %
085								
Nebraska	15.8	81	12.0	0	0.14	0	0.65	0
Iowa	2.34	32	0.54	0	.03	0	0.17	0
Total	18.1	74	12.5	69	0.16	0.72	0.82	4.5
086								
Nebraska	.06	26	0		0		0.016	
Iowa	6.58	7.6	0.15	-	0.013		0.335	
Total	6.6	8	0.15	2.1	.013	0.14	.35	5.1
145	14.5	17	2.0	14	.08	0.6	0.38	2.6
146	74.3	9.3	0.57	0.8	4.6	6.2	1.7	2.3

(a) 1972 National Emissions Report, EPA - 450/2-74-012, June 1974

Table A-9. Nebraska Required Emission Reductions - PARTICULATES

AQCR	SIP: AQ Measurement Control Value	SIP: Emissions (10^3 tons)	SIP: Allowable Emissions (10^3 tons)	SIP: 1975 Estimated Emissions After Controls (10^3 tons)	1973 Data: Percent Reduction Required Based On 1973 AQ Data	1973 Data: NEDS Emissions (10^3 tons)	1973 Data: Allowable Emissions (10^3 tons)	1973 Data: Emission Tolerance (10^3 tons)
085 (Neb and Iowa)	139 $\mu g/m^3$ (AGM)	25.2	8.31	8.01	53	18	8.5 (entire AQCR)	0 [a]
086 Neb	N/A	N/A			21	.06		
Iowa					33	6.58		
						6.6	4.4	0 [b]
145	77 $\mu g/m^3$	4.16	2.91	2.89	65	14.5	5.07	0 [c]
146	N/A	N/A			58	74.3	31	0 [b]

a AQCR 085 was the approved example region for the state. Allowable emissions for SIP and those calculated from current air quality are comparable. Since 1972 NEDS emissions are less than origional SIP inventory, it is assumed that controls are being applied. Therefore there is no indication that overkill will result after SIP is implemented.

b No SIP emissions information was available for this analysis. Tolerance is based on current air quality.

c "SIP" emissions are those estimated by EPA for AQCR 145 (Implementation Plan Evaluation Report). Current NEDS emissions are higher than EPA 1970 estimates, suggesting non-comparable data bases. Since current air quality suggests problems still exist and EPA emission estimates for 1975 show little overkill, it is assumed that no particulate emission tolerance will exist.

Table A-10. Nebraska Required Emission Reductions - SO_2

	SIP				1973 Data			
AQCR	AQ Measurement Control Value	Emissions (10^3 tons)	Allowable Emissions (10^3 tons)	197_ Estimated Emissions After Controls (10^3 tons)	Percent Reduction Required Based On 1973 AQ Data	NEDS Emissions (10^3 tons)	Allowable Emissions (10^3 tons)	Emission Tolerance (10^3 tons)
085	18 $\mu g/m^3$ (AGM)	61.1	-	68	none	45.3	-	see a
086	N/A	-	-	-	none	14.7	-	a
145	N/A	-	-	-	none	16.0	-	a
146	N/A	-	-	-	none	10.5	-	a

a All air quality readings well below standards. This may merely reflect, however, that SO_2 monitors are not source oriented. No regional omission tolerance is calculated by proportional "roll up" since unrealistic numbers would result. It can only be said at this point that some increase in SO_2 emissions could be tolerated.

Table A-11. Nebraska Fuel Combustion Regulations

	Existing Sources(2)		New Sources
	Input (10^6 BTU/hr) (I)	Emission Limit (A) lbs/10^6 BTU	
Particulates	10	0.60	power plants only [1] 0.11b / 10^6 BTU
	3800	0.15	
	$A = 1.026\ I^{-0.2333}$		
SO_2	2.5 lbs SO_2 / 10^6 BTU		0.8 lbs SO_2 / 10^6 BTU [1] (liquid fuels)
			1.2 lbs SO_2 / 10^6 BTU (solid fuels)
NO_2	No regulations on fuel burning equipment		federal standards apply [1]

[1] Federal new source performance stds., 36 Fed. Reg. 24876 Dec. 23, 1971

(2) Having heat input greater than: (a) 0.6×10^6 BTU/HR - coal
(b) 7.5×10^6 BTU/HR - oil
(c) 100×10^6 BTU/HR - gas

APPENDIX B

Tables B-1 and B-2 are the assessment of AQCRs which should be examined for the fuel switching impact on particulate and SO_2 emissions. They also provide an identification of those AQCRs which show little potential for fuel revision or regulation relaxation if ambient air standards are to be attained.

Those AQCRs designated "good" or "marginal" here will be examined in later appendices where an attempt will be made to estimate the emissions resulting from an assumed fuel schedule different from the present, or the emissions which might result if all fuel burning sources emitted up to their "allowables."

The criteria for candidates are (1) the severity and breadth of air quality violations, (2) the tolerance for emissions increased in the AQCR, (3) the fraction of total emissions resulting from fuel combustion, and (4) AQMA designations. It should be noted that an AQCR may not necessarily need relaxation of regulations in order to accomplish fuel switching. Further, a good candidate in Tables B-1 and B-2 may later show little potential for fuel switching after individual sources are examined. Finally it is posssible that an AQCR may have air quality levels below standard at present and may require more <u>strict</u> regulations than currently exist if all fuel burning sources were converted to dirtier fuels, i.e., "average" emission rate now may be below "average" regulations.

Table B-1. Candidacy Assessment for Relaxation of Particulate Regulations/Fuel Switch Potential

AQCR	Air Quality: # Monitors	Air Quality: # Sta. Showing Violations	Expected Attainment Date	Any Counties AQMA Designations?	Total Emissions[a] (10^3 tons/year)	% Emission from Fuel Combustion	Tolerance for Emissions Increase (10^3 tons)	Is Region A Candidate for Relaxation?
085								
Nebr	12	6	7/75	No	15.8	81		Bad Candidate
Iowa	3	3			2.34	32		
						74	0	
086								
Nebr	1	1	7/75	No	.06	26		Bad Candidate
Iowa	1	1			6.58	8		
					6.6	8	0	
145	13	3	7/75	No	14.5	17	0	Marginal Candidate
146	18	7	7/75	No	74.3	9	0	Bad Candidate

(a) "1972 National Emissions Report" EPA 450/2-74-012, June 1974

Table B-2. Candidacy Assessment for Relaxation of SO_2 Regulations/Fuel Switch Potential

AQCR	Air Quality: # Monitors	Air Quality: # Sta. Showing Violations	Expected Attainment Date	Any Counties AQMA Designations?	Total Emissions(c) (10^3 tons/year)	% Emission from Fuel Combustion	Tolerance for Emissions Increase (10^3 tons)	Is Region A Candidate for Relaxation?
085								
Nebr	2	0	a	No	37.3	77	b	Good Candidate
Iowa	1	0			8.0			
	3	0			45.3			
086								
Nebr	0	0	a	No	0.09	50	b	Good Candidate
Iowa	1	0			14.64	95		
					14.7	95		
145	2	0	a	No	16.0	96	b	Good Candidate
146	2	0	a	No	10.5	58	b	Good Candidate

a already below A.Q. Standards

b insufficient data to assign a quantitative estimate to tolerance

(c) "1972 National Emissions Report" EPA -450/2-74-012, June 1974

APPENDIX C

This section is a review of individual power plants by AQCR. The intent is to illustrate fuel switching possibilities and particulate and SO_2 emissions resulting from these switches on an individual plant basis. The total AQCR emissions resulting from such switches is then calculated.

Current power plant information used to prepare Table C-1 were obtained from three main sources: (1) Federal Power Commission computerized listings of power plants and their associated fuel use, (2) the National Coal Association "Steam Tables" listing of power plants and fuel use in 1972, and (3) NEDS Emissions data.[1] For those plants listed by the FPC (1 above), the 1973 fuel schedule was assumed, otherwise, fuel use is for 1972. Heat inputs are those based on actual fuel values where known, and average values shown in Table C-3 were used where not known. SO_2 and particulates emissions are those associated with the fuel use shown. In the case of particulates, emissions were calculated using NEDS emissions factors applied to the listed fuel schedule (in both tonnage and lbs/10^6 Btu). When a plant was not listed in NEDS, AP-42 emission factors were used to estimate SO_2 and particulate emissions (see Table C-3).

After the name of each plant is a listing of the fuels for which the plant was designed (from source 2). For the purposes here, it is assumed that when a plant is shown to have dual fuel capability, it is able to use entirely one fuel or the other. A fuel switch calculation is then made, assuming all natural gas use is replaced by either oil or coal depending on assumed plant capabilities. Further, oil use is replaced by coal where possible. The % sulfur in fuel (coal or oil) assumed when fuels are switched is indicated in Table C-1. In the case of coal this was the maximum % S which the plant had used in the last four years. (In the case of oil 2% S was assumed.) A plant was then assumed to have the same emission controls as was in effect when the NEDS emissions were assembled. The resulting emissions which would then accompany such fuel switches are tabulated in both tonnage and lbs/10^6 Btu.

[1] NEDS Data Bank 1974

Also shown is the 1975 regulations which are currently applicable to the given plant, taken from Table A-12. (Particulate limits are assumed to be based on the entire heat input of the plant. Actual rules may be different when applied to each of several boilers in a power plant or applied on the basis of design capacity rather than actual amount of fuel used.)

The fuel switch calculations are intended to show the magnitude of emissions increase accompanying a fuel switch without additional controls. The exact emissions would depend upon actual fuel mix, amount of sulfur in fuels, and degree of emissions controls (particulates). The calculations were made as described above because Nebraska AQCRs have an uncertain tolerance for increased SO_2 emissions and essentially no tolerance for particulates emissions increase. Hence, the calculation seems illustrative in showing "worst case sulfur in fuel situation" and the consequent effect on SO_2 and particulates emission.

Table C-2 summarizes the total uncontrolled emissions resulting from fuel switches by AQCR. Also shown are approximate quantities of fuels needed to accomplish such switches.

It might be cautioned that AQCR total emissions calculated in the tables of Appendix C (and also Appendix D) may not agree exactly with total emissions represented in Appendix A (Tables A-7, A-8). This is a resul. of both differing fuel schedules in 1973 compared to previous years and the relative "completeness" of the NEDS data bank.

Table C-1. Nebraska Power Plant Assessment - Metro Omaha AQCR

AQCR	Plant Capacity	Designed for	Fuel Use: Type, % Sulfur, % Ash	Fuel Use: Annual Quantity (1)	Fuel Use: Heat Input (10^6BTU/hr)	Emissions: SO_2 (tons/yr)	Emissions: TSP (lbs/10^6BTU)	S Assumed %	1975 Emission Limit (lbs/10^6BTU): SO_2	1975 Emission Limit (lbs/10^6BTU): TSP	Fuel Switch (Coal): Resulting Emissions (tons/yr): SO_2	Fuel Switch (Coal): Resulting Emissions (tons/yr): TSP	Fuel Switch (Coal): Resulting Emissions (lbs/10^6BTU): SO_2	Fuel Switch (Coal): Resulting Emissions (lbs/10^6BTU): TSP
085	Kramer 114 MW	C	Coal 1.9S 11.2A	180	462	6654	2.1	3.5	2.5	0.22	19000	26700	6.0	8.4
		G	Gas	2269	259	17100	5.4							
					722									
085	Jones St 165 MW	C	Coal 2.7S 9.0A	7.0	18.9	368	0.3	3.3	2.5	0.27	7200	8550	5.4	6.5
		O	Oil 0.1S	141	94.5	535	0.4							
		G	Gas	1659	139	46								
					302	24								
085	No.Omaha 645 MW	C	Coal 1.43S	891	2239	24737	1.35	3.0	2.5	0.15	96800	2610	5.3	0.14
		G	9.0A			1400	0.07							
			Gas	17006	1939									
					4178									
085	So.Omaha 20 MW	O	Oil 2.0S	31	21	204	0.5	2.0	2.5	0.36	874	21	2.2	0.05
		G	Gas	609	69	5	0.01							
					90									

(1) Coal 10^3 tons
Oil 10^3 bbls
Gas 10^6 ft^3

Table C-1 Nebraska Power Plant Assessment - Lincoln-Beatrice-Fairbury AQCR

AQCR	Plant Capacity	Designed for	Fuel Use: Type, % Sulfur, % Ash	Annual Quantity	Heat Input (10^6BTU/hr)	Emissions SO_2 TSP (tons/yr)	Emissions SO_2 TSP ($lbs/10^6BTU$)	% S Assumed	1975 Emission Limit ($lbs/10^6BTU$) SO_2 TSP	Fuel Switch (Coal): Resulting Emissions (tons/yr) SO_2 TSP	Fuel Switch (Coal): Resulting Emissions ($lbs/10^6BTU$) SO_2 TSP
145	Sheldon 229 MW	C	Coal 2.86S 13.1A	237	632	13160 776	2.00 0.12	3.9	2.5 0.19	42450 18401	6.5 0.28
		O									
		G	Gas	7567	863 / 1495						
	K Street Lincoln 30 MW	C	Coal 1.47S 12.4A	15.9	39.6	454 1580	0.81 2.8	4.5	2.5 0.33	4490 5100	8.0 9.0
		O	Oil 0.1S	10.78	7.2	4					
		G	Gas	717.4	81.9 / 128.6						
	U.of Neb (includes agri.)	O	Oil 2.0	81	54	540 20	0.72 0.02	2.0	2.5 0.31	1700 60	2.28 0.04
		G	Gas	1034	117 / 171						
	Fairbury 21 MW	O	Oil	8	5.3	52 2	0.24 0.02	2.0	2.5 0.4	470 36	2.24 0.04
		G	Gas	380	43.3 / 48						
	Schuyler 9 MW		Oil	5	3.4	33 1	0.20 0.20	2.0	2.5 0.44	359 50	2.21 0.04
			Gas	304	34 / 37						

Table C-1. Nebraska Power Plant Assessment - Interstate AQCR

AQCR	Plant Capacity	Designed for	Fuel Use: Type, % Sulfur, % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6BTU/hr)	Emissions: SO_2 TSP (tons/yr)	Emissions: SO_2 TSP (lbs/10^6BTU)	% S Assumed	1975 Emission Limit (lbs/10^6BTU): SO_2 TSP	Fuel Switch (Coal): Resulting Emissions (tons/yr): SO_2 TSP	Fuel Switch (Coal): Resulting Emissions (lbs/10^6BTU): SO_2 TSP
146	Lexington (Canaday) 109 MW	O	Oil 2.0 (est)	23	15	152 (est)	0.05	2.0	2.5	6890	2.3
						4	.02		0.2	180	.06
		G	Gas	5837	665	42					
					680						
	Freemont (L.D. Wright) 41 MW	C	Coal 0.3 S 10 A	25	122	124	0.09 0.21	3.0	2.5 0.3	3140 680	2.5 0.5
		G	Gas	1643	187	12					
					309						
	Freemont 21 MW	C	Coal .3 10 A	11	29	150	0.13	3.0	2.5	1500	3.9
						438 (est)	1.1		0.4	1314	3.4
		G	Gas	505	58	4					
					87						
	Grand Is. (C.W. Burdick) 92 MW	O	Oil 25	7	4.6	50	.05	2.0	2.5	2630	2.5
						2	.02		0.3	100	.10
		G	Gas	2087	237	15					
					242						
	Hasting 54 MW	O	Oil 2 S	16	10.7	106	0.11	2.0	2.5	2050	2.1
						3	.02		.3	60	.06
		G	Gas	1817	207	13					
					218						

Table C-1. Nebraska Power Plant Assessment - Intrastate - AQCR

AQCR	Plant Capacity	Designed for	Fuel Use: Type, % Sulfur, % Ash	Fuel Use: Annual Quantity	Fuel Use: Heat Input (10^6BTU/hr)	Emissions SO_2 TSP (tons/yr)	Emissions SO_2 TSP ($lbs/10^6BTU$)	S Assumed **	1975 Emission Limit ($lbs/10^6BTU$) SO_2 TSP	Fuel Switch: Resulting Emissions (tons/yr) SO_2 TSP	Fuel Switch: Resulting Emissions lbs/BTU SO_2 TSP
146	Alliance 16.5	C	Gas	545	62	0	.0	3.0	2.5	1350	5.0
		G			62	4	.01		.4	1900	7.0
	bluffs (Scotts-bluff) 42 MW	O	Oil	5.4	3.6	9	-			3500	2.3
		G	0.55			1	.02	2.0	2.5	100	.07
			Gas	3003	342	24			3		
					346						
	Ogallala 9 MW	O	Oil 25	1	0.7	7	.02	2.0	2.5	770	2.3
		G	Gas	677	76	5					
					77						

C-2 AQCR 085 Emissions Comparison with Fuel Switch(2)
(Power Plants Only)

Fuel	Present Use Quantity [1]	10^9 BTU/Y	Gas & Oil} to coal Quantity [1]	10^9 BTU/Y	Gas to oil only (2.0% S) Quantity [1]	10^9 BTU/Y	
Coal	1078	24800	2056	47290	1078	24800	
Oil	172	1011	132	776	3760	22554	
Gas	21543	21543	0	0	0	0	
Total		47354		47354		47354	Regional
	Emisssions (tons/y)		Emissions (tons/y)		Emissions (tons/y)		Allowable Emissions(3)
SO_2	31963		124000		56,552		N/A
Particulates	19616		37900		20,400		8500
	lbs/10^6 BtU		lbs/10^6BTU		lbs/10^6 BTU		Regulations lbs/10^6 BTU
SO_2	1.35		5.2		2.3		2.5
Particulates	0.84		1.6		0.86		(.15 - .36)

(1) coal 10^3 tons gas $10^6 ft^3$ oil 10^3 BBL
(2) No additional controls over present are assumed
(3) From Tables A-9 & A-10

C-2 AQCR 145 Emissions Comparison with Fuel Switch[2]

Fuel	Present Use Quantity[1]	Present Use 10^9 BTU/y	Gas & Oil} to coal Quantity[1]	Gas & Oil} to coal 10^9 BTU/y	Gas to oil only (2.0% S) Quantity[1]	Gas to oil only (2.0% S) 10^9 BTU/y	
coal	253	5819	612	14060	253	5819	
oil	105	617	383	2254	1808	106.17	
gas	10002	10002	0	0	0	0	
Total		16478		16434		164500	Regional Allowable[3] Total Emissions
	Emissions (tons/y)		Emissions (tons/y)		Emissions (tons/y)		
SO_2	14239		49270		25535		N/A
Particulates	2379		7043		2650		5000
	lbs/10^6 BTU		lbs/10^6 BTU		lbs/10^6BTU		lbs/10^6BTU
SO_2	1.7		5.9		3.1		2.5
Particulates	0.29		0.85		0.32		(.19 - .44)

(1) coal 10^3 tons gas $10^6 ft^3$ oil 10^3 BBL
(2) No additional controls from present are assumed
(3) From Tables A-9 & A-10

C-2 AQCR 146 Emissions Comparison with Fuel Switch (2)

Fuel	Present Use Quantity (1)	Present Use 10^9 BTU/y	Gas & Oil} to coal Quantity (1)	Gas & Oil} to coal 10^9 BTU/y	Gas to oil only (2.0% S) Quantity (1)	Gas to oil only (2.0% S) 10^9 BTU/y	
coal	36	828	174	4012	36	828	
oil	52.4	308	2213	13010	2797	16422	
gas	16114	16114	0	0	0	0	
Total		17250		17250		17250	Regional
	Emissions (tons/y)		Emissions (tons/y)		Emissions (tons/y)		Allowable Total Emissions
SO_2	496		21800		18617		N/A
Particulates	839		2350		1180		31000
	lbs/10^6BTU		lbs/10^6BTU		lbs/10^6 BTU		lbs/10^6BTU
SO_2	.06		2.5		2.2		2.5
Particulates	.09		0.27		0.14		(.22 - .44)

(1) coal 10^3 tons - gas $10^6 ft^3$ - oil 10^3 BBL
(2) No additional controls assumed
(3) From Tables A-9 & A-10

Table C-3 AP-42 Power Generation Emission Factors

Fuel	Particulates Lbs/Ton	Particulates Lbs/10^6 Btu	SO_2 Lbs/Ton	SO_2 Lbs/10^6 Btu	Hydrocarbons Lbs/Ton	Hydrocarbons Lbs/10^6 Btu	NO_x (as NO_2) Lbs/Ton	NO_x (as NO_2) Lbs/10^6 Btu
Coal[1] (Bit.)								
General	160	7.4			0.3	0.013	18	0.78
Wetbottom 10% A	130	7.0					30	1.3
Cyclone	20	0.9					55	2.4
1% S	Same	Same	38	1.65	0.3	0.013	Same	Same
2% S	as	as	76	3.3			as	as
3% S	Above	Above	114	5.0			Above	Above
Oil[2]	Lb/10^3 Gal		Lb/10^3 Gal		Lb/10^3 Gal		Lb/10^3 Gal	
0.5% S	8	0.058	79	0.56	2	.014	105	0.75
1.0% S	8	.058	157	1.12	2	.014	105	0.75
2.0% S	8	.058	314	2.24	2	.014	105	0.75
Gas[3] (.3 lbs S/ 10^6 Ft^3)	Lb/$10^6$$Ft^3$		Lb/$10^6$$Ft^3$		Lb/$10^6$$Ft^3$		Lb/$10^6$$Ft^3$	
	15	.015	0.57	.00057	1	.001	600	0.60

(1) Coal 23 x 10^6 Btu/Ton
(2) Oil 140 x 10^3 Btu/Gal
(3) Gas 1000 Btu/Ft^3

Table C-4. Nebraska Proposed Power Plant

AQCR	Plant Capacity	Designed for	Fuel Use: Type, % Sulfur, % Ash	Fuel Use: Annual Quantity[1]	Fuel Use: Heat Input (10^6BTU/hr)	Emissions: SO_2 (tons/yr)	Emissions: TSP (tons/yr)	Emissions: TSP (lbs/10^6 BTU)	1975 Emission Limit: SO_2 (lbs/10^6BTU)	1975 Emission Limit: TSP (lbs/10^6BTU)	% S Assumed	Fuel Switch: Resulting Emissions SO_2 (tons/yr)	Fuel Switch: Resulting Emissions TSP (tons/yr)	Fuel Switch: Resulting Emissions TSP (lbs/10^6BTU)
146	Gentleman (Sutherland) 600MW	Coal	Coal 3.0% S 7.7% A	2044	5367	117,540[2]		5.0	1.2			none		
						268[3]		0.011	0.1					

[1] 10^3 tons, assumed 23 x 10^6 BTU/ton
[2] Without SO_2 controls, estimated form AP42
[3] At 99.8% efficiency, NEDS projection

APPENDIX D

The Tables D-1 in this appendix list individual industrial/commercial/institutional sources of particulates and SO_2 emissions which might show fuel switching potential. The sources are from a NEDS rank order emissions listing. At the top of Tables D-1 is the percent of total emissions (both fuel and non-fuel sources) accounted for in the AQCR, since not all sources could be listed in this report. It should be cautioned that the percent emissions accounted for is different than the "% of fuel use accounted for." It is possible that several potential fuel switch sources could be overlooked by the cutoff point on the emissions (i.e., a reasonable sized natural gas used may emit below our cutoff point in the NEDS rank order list).

A fuel switch emissions calculation is then made similar to that performed for power plants. No information was available for feasibility of <u>any</u> fuel switching. It was assumed that only those sources now using some coal had a potential for complete coal conversion. All other sources were switched to oil (2% S) for purposes of emission calculations.

99.4% Particulates
99.7% SO_2

Table D-1. Nebraska Industrial Fuel Switch Assessment
(Metro Omaha AQCR)

AQCR	Industry	Designed for	Fuel Use: Type / % Sulfur / % Ash	Annual Quantity (1)	Heat Input (10^6BTU/hr)	Emissions: SO_2 TSP (tons/yr)	Emissions: SO_2 TSP ($lbs/10^6BTU$)	% S Assumed	Fuel Switch: 1975 Emission Limit ($lbs/10^6BTU$) SO_2 / TSP	Fuel Switch: Resulting Emissions (tons/yr) SO_2 / TSP	Fuel Switch: Resulting Emissions lbs/BTU SO_2 / TSP
085	Allied		Oil	300	5	46	.03	2.0	2.5	3404	
			2			2	.003		0.26	165	
			Gas	3000	342						
					347	27					
	Energy Systems		Oil	174	2.8	9	.01	2.0	2.5	1373	
			0.7			2	.003		0.32	67	
			Gas	1212	138	11					
					141						
	Lueder Construction		Gas	2320	264	1	-	2.0	2.5	2590	
						21	.02		0.27	126	
	Wilson Foods		Oil	956	8	150	0.3	2.0	2.5	519	
			2			6	.02		0.41	25	
			Gas	397	45	4					
					53						
085	Western Electric		Oil	1020	16	156	.46	2.0	2.5	657	
			2			12	.17		.38	32	
			Gas	444	15	4					
					67						

(1) Oil - 1000 gals
gas - $10^6 ft^3$

99.4% Particulates
99.7% SO_2

Table D-1. Nebraska Industrial Fuel Switch Assessment
(Metro Omaha AQCR)

AQCR	Industry	Designed for	Fuel Use: Type, % Sulfur, % Ash	Fuel Use: Annual Quantity (1)	Fuel Use: Heat Input (10^6BTU/hr)	Emissions: SO_2 TSP (tons/yr)	Emissions: SO_2 TSP (lbs/10^6BTU)	% S Assumed	Fuel Switch: 1975 Emission Limit (lbs/10^6BTU) SO_2 TSP	Fuel Switch: Resulting Emissions (tons/yr) SO_2 TSP	Fuel Switch: Resulting Emissions lbs/BTU SO_2 TSP
085	Union Pacific		Oil 2	1095	18	171	1.1	2.0	2.5	363	
			Gas	165	19	12	.07		0.44	18	
					37	1					
	Creighton Hospital		Oil 2	221	3.5	34	0.4		2.5	194	
			Gas	142	16.0	3	.03	2.0	0.5	17	
					20.0	-					
	Doctors Hospital		Oil 2	182	2.9	9	0.7		2.5	29	
			Gas	9	1	1	0.1	2.0	0.6	1	
					3.0						
	Veterans Hospital		Oil 2	150	2.4	24	2.2		2.5	24	
			Gas	1	.1	2	.15	2.0	0.6	1	
					2.5						
085			TOTALS Oil	4098	65	SO_2	602		SO_2	9153	
			Gas	7695	877	Part.	108		Part.	352	
					942						

(1) oil - 1000 gals
gas - $10^6 ft^3$

Table D-1. Nebraska Industrial Fuel Switch Assessment
(Sioux City Interstate AQCR)

AQCR	Industry	Designed for	Fuel Use: Type, % Sulfur, % Ash	Fuel Use: Annual Quantity (1)	Fuel Use: Heat Input (10^6BTU/hr)	Emissions SO_2 TSP: (tons/yr)	Emissions SO_2 TSP: (lbs/10^6BTU)	% S Assumed	Fuel Switch: 1975 Emission Limit (lbs/10^6BTU) SO_2 / TSP	Fuel Switch: Resulting Emissions (tons/yr) SO_2 / TSP	Fuel Switch: Resulting Emissions lbs/BTU SO_2 / TSP
086	Iowa Beef Processors		Oil Gas	670 541	10.7 61 72	33	0.10 0.03	2.0	2.5	706	

(1) oil - 10^3gals
gas - 10^6ft^3

99.6% Particulates
99.6% SO_2

Table D-1. Nebraska Industrial Fuel Switch Assessment
(Lincoln AQCR)

AQCR	Industry	Designed for	Fuel Use: Type / % Sulfur / % Ash	Annual Quantity (1)	Heat Input (10^6BTU/hr)	Emissions: SO_2 TSP (tons/yr)	Emissions: TSP ($lbs/10^6$BTU)	S Assumed %	Fuel Switch: 1975 Emission Limit ($lbs/10^6$BTU) SO_2 / TSP	Resulting Emissions (tons/yr) SO_2 / TSP	Resulting Emissions lbs/BTU SO_2 / TSP
145	Lincoln Regional Center		Oil 2	200	3.1	34		2.0		765	
						10				37	
			Gas	662	75						
					78						
	Lincoln General Hospital		Oil 2	3500	56	556	2.3	2.0	2.5	559	
						40	0.16		.4	42	
			Gas	8	1						
					57						
	Goodyear Tire		Oil 2	716	2.8	112		2.0		540	
						12				26	
			Gas	460	52						
					55						
	Nebraska Wesleyan U		Oil 2	.53	2.4	22		2.0		73	
						1				4	
			Gas	44	5.0						
					7.4						
145			TOTAL Oil	4569	64	724				SO_2 1937	
			Gas	1174	133	63				Part. 109	
					197						

(1) oil - 10^3 gals
gas - 10^6 ft^3

Table D-1. Nebraska Industrial Fuel Switch Assessment (Intrastate AQCR)

99.4% TSP
95.8% SO_2

AQCR	Industry	Designed for	Fuel Use: Type, % Sulfur, % Ash	Annual Quantity (1)	Heat Input (10^6BTU/hr)	Emissions: SO_2 TSP (tons/yr)	Emissions: SO_2 TSP ($lbs/10^6BTU$)	% S Assumed	Fuel Switch: 1975 Emission Limit ($lbs/10^6BTU$) SO_2 / TSP	Resulting Emissions (tons/yr) SO_2 / TSP	Resulting Emissions lbs/BTU SO_2 / TSP
146	Great Western Sugar (Bluffs)		coal 0.5 9	68	179	1000 2400	1.3 3.1	2.0	2.5 0.31	1000 2400	
	Nutone Inc. (Nemah Co)		gas	9360	1067	3 84		2.0		10468 508	
	Farmland Industries (Adams)		oil 0.7S gas	60 1250	1 143 144	3 (SO_2) 11 (TSP)		2.0		1418 68	
	G.W.Sugar (Morril County)		coal 0.5S 9.0A	333	87	317 1940	0.8 5.1	2.0	2.5 0.36	317 1940	
	CRA Inc. (Bluffs)		oil gas	2066 474	32 54 86	98 18		2.0		843 41	
	Iowa Beef (Cuming Co)		oil 0.7 Gas	465 125	7.4 14 41	23 4		2.0		206 10	

(1) coal - 10^3 tons
oil - 10^6 gals
gas - 10^6 ft^3

Table D-1. Nebraska Industrial Fuel Switch Assessment

AQCR	Industry	Designed for	Fuel Use: Type / % Sulfur / % Ash	Fuel Use: (1) Annual Quantity	Fuel Use: Heat Input (10^6BTU/hr)	Emissions SO_2 TSP (tons/yr)	Emissions SO_2 TSP ($lbs/10^6BTU$)	% S Assumed	Fuel Switch: 1975 Emission Limit ($lbs/10^6BTU$) SO_2 / TSP	Fuel Switch: Resulting Emissions (tons/yr) SO_2 / TSP	Fuel Switch: Resulting Emissions lbs/BTU SO_2 / TSP
146	Dana College (Washington)		oil .7 gas	214 93	3.4 11 14	11 3		2.0		137 8	
146			TOTAL coal	101	265	1455 4460					
			oil	2805	45						
			gas	11302	1288						
					1600						

TABLE D-2. NEBRASKA INDUSTRIAL SOURCE FUEL SUMMARY

	WITH PRESENT FUELS			EMISSIONS		WITH FUEL SWITCH			EMISSIONS	
AQCR	COAL 10^3tons	OIL 10^3bbl.	GAS $10^6 ft^3$	SO_2 ton/y	PART. ton/y	COAL 10^3ton	OIL 10^3bbl.	GAS $10^6 ft^3$	SO_2 ton/y	PART. ton/y
085	0	98	7696	602	108	0	1414	0	9153	352
086	0	16	541	33	10	0	107	0	706	34
145	0	109	1174	724	63	0	335	0	1937	[illegible]
146	101	67	11302	1455	4460	101	1978	0	14389	4679
STATE TOTALS	101	290	20710	2814	4641	101	3834	0	26185	5174

APPENDIX E

Table B-1 shows area source fuel use for the entire state of Nebraska. The approximate energy values are compared for each fuel along with the percent of overall energy derived from each fuel. A breakdown by AQCR was not available at the time of preparation of this report (data are those in NEDS data bank, September 7, 1974). Area source fuel use is then compared to total fuel use in Nebraska. The bottom row entitled "all fuels, all sources" may not match totals from Appendices A, C, and D exactly, since neither the NEDS or individual appendix totals are all-inclusive. Also fuel schedules may change from one year to the next.

TABLE E-1. TOTAL STATE AREA SOURCE FUEL USE(1)

Source (Area Only)	Coal		Resid. Oil		Dist. Oil		Gas		Wood		Total
	10^3tons	10^9BTU	10^3gals.	10^9BTU	10^3gals.	10^9BTU	10^6ft^3	10^9BTU	10^3tons	10^9BTU	10^9BTU
Residential	19250	443	-	-	51540	7216	61370	61370	12.1	145	69,174
Industrial	0	0	5530	774	12480	1747	39100	39100	0	0	41,621
Commercial/ Institution	10	0	4550	637	62640	8770	54040	54040	0	0	63,447
Total (area sources)	19250	443	10080	1411	126660	17732	154510	154510	12.1	145	174,241*
% By Fuel		0.25%		0.81%		10.2%		88.7%		0.8%	
Total (all fuels, all sources)	1105775	25432	24009	3361	130896	18325	213775	213775	0	0	260,893*
% By Fuel		9.7%		1.3%		7.0%		81.9%			

* Note that 66.8% of total fuel use is by area sources in Nebraska

(1) NEDS data bank, Sept. 1974

APPENDIX F

The Tables F-1 and F-2 illustrate the effect on emissions of particulates and SO_2 when power plant and industrial fuel burning sources listed in Appendices C and D are allowed to emit up to the amounts that existing regulations would allow. It is assumed that heat input remains the same, and existing regulations are applied to gross heat input for each AQCR. Non-fuel emission estimates for particulates for 1972 are included along with a column for "allowable total emissions." It is emphasized that this table is hypothetical in that no fuel mix may exist to allow all sources to emit exactly at regulation levels. The calculations do give some insight into adequacy of existing regulations for allowing air quality standards to be achieved if a fuel schedule different from the one at present were in effect. Table F-3 is a Nebraska fuel summary.

TABLE F-1. NEBRASKA PARTICULATE REGULATION EXAMINATION

AQCR	10^{12}BTU/y	Current Emissions tons/y	Emissions Regulations lbs/10^6BTU	Emissions With All Fuel Sources Emitting At Regulations	Estimated Allowable Emissions for AQCR tons/y (Nebraska only)
085 (Nebraska only)					
Power Plants	47.3	19800	0.15 - 0.36	3940[1]	
Industry	8.25	108	0.30	1238[2]	
Area Fuel		650	No reg. assumed	650	
Non-Fuel Estimate	0	3000	Undetermined	3000 uncontrolled	
Total Estimate		23558		8828	7420
086	No power plants and few other emissions originating in Nebraska				
145					
Power Plants	16.5	2380	0.19 - 0.44	1817[1]	
Industry	1.73	63	0.4	345[2]	
Area Fuel		380	No reg. assumed	380	
Non-Fuel Estimate	0	12000	Undetermined	12000 uncontrolled	
Total		14823		14542	5000
146					
Power Plants	17.25	840	0.22 - 0.4	2514[1]	
Industry	14.02	4460	0.3	2102[2]	
Area Fuel		1700	No reg. assumed	1700	
Non-Fuel	0	66000	Undetermined	66000 uncontrolled	
Total		73000		73320	31000

[1]Applicable regulation based on gross heat to each plant was used to calculate individual allowed emissions. The tonage was summed for entire AQCR.

[2]Approximate particulate regulation applied to gross heat input to all industrial sources in Table D.

TABLE F-2. NEBRASKA SO_2 REGULATION EXAMINATION

AQCR	10^{12}BTU/y	Current SO_2 Emissions tons/y	Regulations lb/10^6BTU	Emission When All Fuel Sources Emit at Regulations
085				
Power Plants	47.3	32000	2.5	59125
Industry	8.25	602	2.5	10313
Area Sources (est.)	-	1930		
Non-Fuel Estimate	0	8560	-	8560 uncontrolled
TOTAL		43092		77998
086	No significant sources in Nebraska			
145				
Power Plants	16.5	14240	2.5	20625
Industry	1.73	724	2.5	2163
Area Sourdes (est.)	-	810		
Non-Fuel Estimate		640	-	640 uncontrolled
TOTAL		16410		23428
146				
Power Plants	17.25	498	2.5	21563
Industry	14.02	1460	2.5	17525
Area Sources		4400		
Non-Fuel		4410	-	4410 uncontrolled
TOTAL		10770		43498

BIBLIOGRAPHY

(1) "1972 National Emissions Report", U.S. Environmental Protection Agency, EPA-450/2 - 74 - 012.

(2) "Projections of Economic Activity for Air Quality Control Regions", U.S. Department of Commerce, Bureau of Economic Analysis, Prepared for U.S. EPA, August 1973.

(3) "Monitoring and Air Quality Trends Report, 1972", U. S. EPA - 450/1-73-004.

(4) "Steam-Electric Plant Factors/1072", 22nd Edition National Coal Association.

(5) "Federal Air Quality Control Regions" U.S. EPA, Pub. No. AP-102.

(6) "Assessment of the Impact of Air Quality Requirements on Coal in 1975, 1977 and 1980", U.S. Department of the Interior, Bureau of Mines, January 1974.

(7) "Fuel and Energy Data", U.S. Department of Interior Bureau of Mines. Government Printing Office, 1974, 0-550-211.

(8) "Compilation of Air Pollutant Emission Factors, 2nd Edition", U.S. EPA, Air Pollution Tech, Pub. AP-42, April 1973.

(9) SAROAD Data Bank, 1973 Information. U.S. EPA.

(10) Federal Power Comission, U.S. Power Plant Statistics Stored in EPA Data Bank, September 1974.

(11) NEDS Data Bank, Information as of September 1974, U.S. EPA.

(12) "Air Quality Implementation Plan for the State of Nebraska"

(13) "Air Pollution Control Rules and Regulations" State of Nebraska Department of Environmental Control, Effective February 26, 1974.